

National Aeronautics and Space Administration

Office of Aerospace Technology

**Revolutionize Aviation Subcommittee Meeting
of the Aerospace Technology Advisory Committee**

NASA Headquarters, 300 E Street, S.W., Room 7H46
Washington, D.C.

September 20, 2002

MEETING REPORT

Terrence J. Hertz 11/18/02
Terrence J. Hertz (date)
Executive Secretary

David E. Crow 11/20/02
David E. Crow (date)
Chair

*Meeting Report Prepared by:
Linda Voss, Consultant
RS Information Systems, Inc.*

Revolutionize Aviation Subcommittee Meeting Report**Table of Contents**

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Revolutionize Aviation Subcommittee Meeting Minutes

Section I. Subcommittee Presentations

Welcome/Remarks from Chair

Dr. David Crow, Chair of the Revolutionize Aviation Subcommittee (RAS), welcomed the members and reviewed the agenda. He stated that morning was going to be devoted to reviewing the Revolutionize Aviation programs, and the afternoon was to identify and charge four working groups aligned with those programs. Mr. David Swain, Chair of the Aerospace Technology Advisory Committee (ATAC), has directed the advisory subcommittees to stay at a high level for the reviews. Dr. Crow thanked the members for volunteering their services to advise NASA.

Advisory Committee Overview

Mr. Benjamin Neumann presented the organization of the NASA advisory committees and how they align with NASA's five Enterprises. The Revolutionize Aviation Subcommittee is a subcommittee of the ATAC, which is a standing committee of the NASA Advisory Council (NAC), which directly advises the NASA Administrator. Each Enterprise has its own advisory committee that reports to the NAC. Expert advice from the external community is part of NASA's mandate. All of the advisory committee meetings are open to the public and announced in the Federal Register. Members who are Special Government Employees (SGE's) are subject to criminal and ethical codes related to conflicts of interest under the Federal Advisory Committee Act (FACA).

The Aerospace Technology Enterprise is in the process of reorganizing along the following four strategic theme areas to give focus to its strategic goals:

- Revolutionize Aviation
- Advance Space Transportation
- Pioneer Revolutionary Technology
- Commercialize Aviation

Each theme area has an advisory subcommittee. The recommendations of the subcommittees go to the ATAC and are then passed on to the NAC. They aren't official until the NAC presents the recommendations to NASA, but in the meantime program staff listen in on the discussion. The ATAC's next meeting is scheduled for October 1-2, 2002, which includes a joint meeting with the Research, Engineering and Development Advisory Committee (REDAC) of the Federal Aviation Administration (FAA). The RAS will report to the ATAC at that time. NASA recommends changing the subcommittee meeting dates to February and June so the advisory subcommittee can affect budget planning decisions.

The RAS also has under its purview two standing subcommittees. The origin of the Small Aircraft Transportation System Subcommittee (SATSS) is language in an appropriations bill. The Aviation Safety Reporting System Subcommittee (ASRSS) is part of an agreement with the FAA. SATSS Chair, Ronald Swanda, is already a member of RAS. **ASRSS Chair, Bill Wirth, should be considered for membership as well¹.**

Revolutionize Aviation Overview

Mr. Terrence Hertz presented NASA's vision and mission statements, which came out of the new Administrator's spring retreat. Aeronautics fits under the vision "To improve life here" and under the mission statement "To understand and protect our home planet" in the work they do for the public good in transportation and aviation. All of the Enterprises contribute to the mission statement "To inspire the next generation of explorers." "As only NASA can" represents their focus on working in areas which others cannot undertake.

Mr. Hertz reviewed the FY 2003 budget for Revolutionize Aviation's three programs: Airspace Systems, Aviation Safety, and Vehicle Systems. These three programs are addressing the five enabling objectives under the Revolutionize Aviation theme. Each objective has metrics and partners in the commercial sector or other government agencies.

They are working under a new NASA Blueprint for Aeronautics. The Blueprint makes the case that revolutionary advances are possible in aviation, that aviation is not necessarily mature, and due to the high risk of these revolutionary advances, aeronautics research and technology is not corporate welfare. The Blueprint contends that aviation could enter another S-curve of technology development where information technology and nanotechnology coupled with biologically-inspired designs result in revolutionary structures, morphing, and other advances.

Additionally, Mr. Hertz noted that while the FY 2004 budget is embargoed, there are opportunities for the RAS to help NASA shape the FY 2005 budget.

Mr. Hertz presented the ATAC assignments to the subcommittee. **They would like the subcommittee to look at NASA's vision and mission and the aeronautics strategic goals and address the following questions:²**

- **Are they relevant?**
- **Are they the right investment?**
- **Are they responsive to the changing national needs?**
- **Is NASA employing the best practices and using technology effectively?**

The subcommittee discussed strategic issues. Members questioned whether the United States had a strategic response to the European Union's (EU) Vision 2020. The EU has let it be known that they intend to be world leaders in aviation and are pushing for resources to address

¹ Action: Ed Crow

² Action: Subcommittee Members

noise and emissions reduction and safety goals. Subcommittee members were interested in a strategic assessment of the EU's activities and the strategic implications for NASA, in particular, whether they take the position of cooperating or competing with the Europeans. John Kern's October 1st briefing addressed these issues. Dr. Crow felt assessment of NASA's goals was within the subcommittee's purview, but that a strategic assessment of the EU might more properly be done by the Aerospace Commission, partly because of the complexities and layers of the European system. There was concern that there is no single point of responsibility to assess what aerospace research needs to be done and make it happen in the United States like there is in Europe.

The subcommittee discussed Revolutionize Aviation's objectives and the absence of revolutionary aircraft products in the goals was discussed. The vehicles come under the outcomes the goals enable. The goals are the "what," the vehicles are the "how." In a public venue, NASA should use appropriate vehicle classes as a basis to define technology development needs. These vehicles will have capabilities that enable them to meet the goals. There was concern about safety getting lost in security. Protecting against inadvertent accidents is different than protecting against those who are trying to do harm, and it protects more lives. **Any subcommittee member with comments on the Revolutionize Aviation objectives was asked to email suggestions to Terry Hertz³.**

NASA's Aviation Safety Program

Mr. George Finelli showed a chart which predicted an increase in air traffic accidents given the projected growth in air traffic with a stable accident rate. The chart was formulated as part of a 1996 national initiative that resulted in a goal to reduce the fatal aircraft accident rate by 80 percent within 10 years. NASA responded by forming the Aviation Safety Investment Strategy Team (ASIST) with an aeronautics technology objective of reducing the aircraft accident rate by a factor of 5 by 2007 (10 years from 1997) and 10 by 2022. They approached the accident reduction in three strategic investment areas: accident prevention, accident mitigation, and aviation system monitoring and modeling.

Mr. Finelli presented the program activities in Vehicle Safety, Weather Safety, and System Safety areas, including crash worthiness, fire prevention, better weather information, and de-icing improvements. They are conducting research with human factors including the man-machine interface with experimental display concepts in synthetic and enhanced vision. Control technologies enable upset recovery (called "refuse to crash"). They are working on monitoring systems that involve small, light sensors, neural nets, and propulsion system and gas tank monitoring. He presented some of the technology transfer achieved. Weather Service International is using some of their weather technology. Also, Boeing and FAA are holding a conference in Seattle, WA, to work on roadmaps for implementing synthetic and enhanced vision. He presented program milestones and performance metrics.

As the program progresses, they are developing partnerships. Historically, they have a strong partnership in fire prevention. Synthetic vision is a new partnership. They have contributed Emmy-Award winning programs to NASA's educational goal. If subcommittee

³ Action: Subcommittee Members

members have any educational needs, the Aerospace Technology Enterprise is equipped to support them with outstanding educational materials.

The subcommittee members expressed some concern with safety goals that could not be reached in the planned timeframe and asked how the program would measure its results or successes. The success of the program will depend on translation into tangible impacts on the aviation system. The airlines are reluctant to provide data that could be used to measure progress toward the goals.

The subcommittee was interested in the program's efforts to collect flight data. The existing Flight Operations Quality Assurance (FOQA) system collects event data. The ideal environment would be for the airline operators to have the incentive to collect data and get something like operational efficiencies out of what's being thrown away. The Aviation Safety Program's Aviation Performance Measurement System (APMS) is capturing aircraft operational efficiencies and safety data that could be mined for safety and event analysis. NASA is best equipped to conduct research on how to equate that to reducing the accident rate and concern was raised by the subcommittee about how APMS gets across the stovepipe.

The subcommittee agreed that the "AvSP Interim Assessment" chart was a good basis for developing metrics that will allow assessments to be recognized by the community to aid in NASA's credibility. They would like to advertise success stories like controlled flight into terrain and the "refuse to crash" technology.

NASA's Airspace Systems Program

Mr. Robert Jacobson presented the Airspace Systems program goals, objectives, and projects. Airspace Systems is concerned with developing technology for air traffic management. They are dealing with revolutionary technologies and balancing the FAA's desire to be evolutionary. The users of the National Air Space system have different interests. Airspace Systems is pushing the system.

Additionally, Mr. Jacobsen described the projects. Airspace Operations Systems (AOS) is a human factors project that looks at increasing capacity in ground, satellite, and vehicle systems including human operators. Advanced Air Transportation Technologies (AATT) improves air traffic management to increase capacity, flexibility, and efficiency. Some of the products that have been delivered to FAA are running into implementation issues due to the lack of acceptance of automation. Pilots are not confident of the implications of how changing one piece changes the system as a whole. Small Aircraft Transportation System (SATS) brings small aircraft technology into the larger picture. The goal is to make many more airports available that are not now equipped for instrument approach using synthetic vision, reducing landing requirements, and an airborne internet to get data to the cockpit inexpensively. Virtual Airspace Modeling and Simulation (VAMS) models the whole National Air Space and explores advanced concepts. Participants will contribute their models tuned to specific applications and have them connected on a common mainframe. Contributors will have access to the compiled model information, which will then be improved upon to fill in the gaps. Once the system is complete, new operational concepts can be tested on it.

Airspace Systems is working on some new exploratory technology dealing with wake vortex and tiltrotor. In the last 35 years, a lot more has been learned about wake vortices, but the only change is to increase the separation between planes, which is the wrong direction. They are working with Euro-Control to apply what is known in the western world to operational solutions. The future of communications and surveillance is space based.

Vehicle Systems Program

Mr. Richard Wlezien presented the goals and objectives of the program. The Vehicle System Program is undergoing a replanning process to integrate programs, simplify/focus innovative technology, and strengthen the link to industry and universities. The program has been good at pushing technology and developing revolutionary component systems, but it needs to work with industry and universities to better define technology pull. The programs under noise and emissions are focused. The vehicle sector of the program is much broader and needs strategic planning. He brought in an external Red Team for expert advice. The team was concerned that the responsibility and accountability for the Vehicle Systems Program is at Headquarters while the authority is at the Centers. They were concerned with involving customers and transitioning technologies before technology readiness level of 6 was achieved. They suggested organizing the program by vehicle classes with sub-goals in each class and utilizing benchmarking to overcome corporate inertia.

The vehicle concepts Vehicle Systems is working on include: advanced subsonic transports, supersonic transports, general aviation, runway independent air vehicles, and unmanned aerial vehicles (UAV's). NASA has a strong program in high-altitude, long-endurance UAV's. They are looking for a permanent presence over the oceans and in space that could replace cell towers and conduct Earth observation for less cost, which is a new market niche. Shared ownership makes small supersonic transports more attractive in the commercial world. Vehicle Systems is looking to reduce the sonic boom and lower the costs to fly long distances. More futuristic are runway-independent and personal air vehicles.

The program is green on performance goals after recalculating them to incorporate recent budget cuts. To avoid the criticisms that their programs continue forever, that they rarely consider new ideas, and that NASA is funding its Centers to keep them open, programs have been asked to identify sunsets on their projects to clearly articulate when new activities are started. Vehicle Systems makes use of NASA wind tunnels and other test facilities. The RAS will not look at facilities; that is the ATAC's job.

Section II. Subcommittee Discussions

Aerospace Technology Enterprise

Dr. Jerry Creedon thanked the committee members for their guidance. He felt the Enterprise themes flowed well from the Agency mission and vision and the programs fit well with where the Administrator wanted to go. If the subcommittee disagreed, he would like to hear their comments. Aviation is an area he is interested in growing. He agreed with the importance of

not sacrificing safety for security. He commented on the need to transfer technology and move on. They have to propose technology directions within their budget. Their budget must be three things: responsible, credible, and compelling.

He asked for the subcommittee's help in critiquing and giving direction for them to do things that are credible within the allocated budget. He requested the subcommittee comment on the following⁴:

- **The programs they have planned and whether the content, goals, and how they are going about it are right.**
- **Whether the subcommittee finds the story compelling or can make it more compelling.**
- **Whether the balance is correct within the given budget.**
- **Where should we be trying to grow the program, given growth could come from the outside.**
- **Whether the subcommittee has some first-order idea of how they're going to take technology they want to collaborate on and make sure it is used.**
- **How should we use the subcommittee.**

Dr. Creedon felt Revolutionize Aviation was in relatively good shape except that Vehicle Systems needs to be reorganized. **He asked for the subcommittee's thoughts on how to approach the Vehicle Systems Program⁵, which is currently organized into seven projects.** Dr. Crow suggested the subcommittee think about approaches before the next meeting. Outside support is greater than in the past, and there is opportunity for growth. Aeronautics is a budget line item.

Dr. Crow discussed with the subcommittee the standing subcommittees under their purview. Dr. Ronald Swanda proposed broadening the goals of the Small Aircraft Transportation System Subcommittee (SATSS) from a general aviation perspective to cut across all programs. Should the SATSS overlap with all those investment areas—safety, infrastructure, and vehicles—for a general aviation infrastructure? SATS involves over 5,000 airports for general aviation. Professor Hansman commented that limiting SATS to general aviation would run the risk of marginalizing it. Mr. Swanda saw VAMS infrastructure modeling as part of the SATS philosophy. SATS would be a subset under the overarching systems study umbrella.

Mr. Swanda commented that there are many things NASA is doing for General Aviation (GA), but it is not reflected at the level of the strategic planning. **He was looking forward to including GA in the language of NASA's strategic plans as it formulates them⁶.** Dr. Crow commented that he was encouraged at the personal vehicle, small supersonic transport, and runway-independent vehicle concepts. All three are vehicles GA should be interested in.

Mike Torok brought up the criticism of NASA supporting corporate welfare and said that in rotorcraft, he could point to examples (like the composite airframe program) where Europe

⁴ Action: Subcommittee Members

⁵ Action: Subcommittee Members

⁶ Action: Mr. Swanda

defined a specific product because they embraced partnerships and promoted companies, and in this country the goals were generic because NASA keeps companies at arm's length. Europe now has a vehicle flying and the United States doesn't. It might be useful to engage industry, which thinks closer than 20 years out.

Dr. Creedon had returned for further discussion with the RAS. He stated that NASA aeronautics needed to balance near and long term in their portfolio. If NASA tries to do things too near term, the money will be taken away. There is a chasm between when NASA has research ready to be transferred and industry adoption. He was just in a meeting where they discussed that it was not fair to measure success by research that is ready: they should measure success by what gets used. They have to figure out how their work will be picked up by industry. In their portfolio, they need to have some things longer term (about 15 years out). The FAA can do nearer term things. It's an interesting requirements problem because it is hard to get users to think more than 48 hours ahead, but the job is to get them to think strategically. Dr. Borger pointed out that General John P. Jumper, Air Force Chief of Staff, was talking about technology development for the Air Force in terms of capability for the warfighter. Technology selection would be based on what the user wants. For NASA, it would be the rotorcraft community telling NASA what capabilities it needed. Dr. Creedon conceded that sometimes it is necessary to go forward without a user. Ames is working on technology today, which the FAA loves, that they tried to kill for the last 5 years. Customers don't always know what they want, and the work has to be ready for when they discover they need it.

The subcommittee raised the issue of the stretch goals. They seemed like a good idea 5 years ago, but today a credibility gap is opening. The subcommittee didn't reach consensus on whether the technology currently exists to reach the goal. But they did agree that the implementation of the technology could not be accomplished by 2007 or even 2010. Mr. Swanda stated the GA community never bought into the safety goal. Dr. Creedon liked the goal because it aimed at significantly reducing accident rates. Professor Hansman suggested the goal was good and the direction was right, but they might want to lose the numbers. He observed it might be better to choose the technology path with a better implementation plan because it had a better chance of success.

One of the difficulties in establishing objectives and supporting a national goal is that NASA doesn't do all the work. Dr. Creedon said NASA could promise to work with everyone to get the technologies and work like crazy to implement them. NASA isn't in the driver's seat, but it is a player in alliance with other organizations. Professor Hansman suggested taking responsibility for implementing the goals, getting with the people who are responsible, and identifying who is in charge of what. Mark Anderson agreed NASA needed to make bold statements in its goals, but given the current stretch goals are unreachable, NASA could either address the problem now or a bad day was coming. Dr. Crow suggested NASA change their objectives now to make the goals reachable and include legitimate, credible work within the right timeframe. NASA should report on its successes, but not break the goal into so many small pieces that no one can connect to the overall goal. Controlled flight into terrain was mentioned as a great success for NASA. Twenty years ago it was a big spike on the accident chart. In this country, it is no longer a problem. The problem is the solution had many contributors—operators, manufacturers, the FAA, et al. NASA didn't have control over the

outcome. It is a fortunate time to make the goal more realistic. **John O'Brien and Chris Hart volunteered to work with the Commercial Aviation Safety Team (CAST) to come up with some recommendations that might include NASA and the FAA working in closer partnership to achieve a new goal**⁷. It might not be the FAA's Safer Skies anymore, but reworded to what is achievable. It might have tasks associated with implementation even to the point of being mandated. They could come up with some recommendations of how NASA could help. In the next phase, NASA could help the FAA use flight data recorder and control information that is currently being thrown away. NASA could be helpful in how to get better at using the large amounts of data and is the world's best at human factors. The beauty of the partnership would be a definitive implementation strategy of 30 programs that everyone has already agreed to do, funding is allocated, and industry and government have agreed on, to reduce the risk of accidents by 67 percent based on the economic realities of today. To a reminder to include GA, the subcommittee responded that the FAA excluded GA in Safer Skies, NASA didn't. **The chair of the safety working group, John O'Brien, was tasked with reworking the goal to be a powerful, capabilities-based goal without making it soul destroying**⁸. Dr. Creedon wants to cooperate with the initiative. NASA's participation would have to be research-based. If the technology is there and what's left is implementation, that is too near-term for any R&D activity. The model should be the infrastructure plan. John O'Brien clarified that they needed to develop a transition plan as opposed to an implementation plan.

The subcommittee raised the issue of a national aerospace strategy in light of the European Union's 2020 vision and whether the United States would be cooperating or competing with the Europeans. The subcommittee also questioned whether the Aerospace Commission was taking a role in developing a national strategy and talking about a role for NASA. Dr. Crow was part of a National Science Foundation (NSF) / National Academy of Engineering (NAE) roundtable a month ago, where they heard a report on the work of the Commission. The Commission plans to recommend a national strategy and organizational changes within the U.S. government. What the recommendations will be and whether they will be turned into reality is not known. There may not be clearly defined roles, and the strategy might not be specific. Congress and the President commissioned this work, but who will champion it is not clear. Two committee members mentioned the German research organization Deutsche Forschungsanstalt für Luft-und Raumfahrt (DLR). One to say they were talking about collaborating on safety technology. Another member talked about work NASA, the Office of Naval Research, and DLR did that the DLR targeted to a specific product that is now in competition with U.S. products. In response to a comment about the possibility of collaboration on low-TRL technology, Dr. Creedon responded that the United States' low-TRL research is available to anyone, which is not true of European research. **Dr. Crow took an action item to write a white paper for the ATAC on European Union's Vision 2020**⁹.

Dr. Creedon reiterated his proposal to the Pioneering Revolutionary Technologies (PRT) Advisory Subcommittee that NASA respond to the subcommittee's recommendations within 2 weeks on which ones were adopted and what action items were taken. They will report at the

⁷ Action: John O'Brien/Chris Hart

⁸ Action: John O'Brien

⁹ Action: Dr. Crow

next meeting on what they did. But he requested the subcommittee reach a consensus and clarity on what they would like NASA to do.

RAS Subcommittee Discussion

Dr. Crow proposed that each subcommittee member volunteer to be on one of the three working groups¹⁰. The three groups would be asked by February to come back with a report (can be in presentation form) assessing the existing programs based on the evaluation questions below with the aim of helping NASA establish credibility in industry and with funding agencies. Each group would have a chair and could call on the extensive list of names of others in the industry to help with the assignment. The chair should expect to work closely with his NASA program managers. **Terry Hertz asked the Program Managers to make available the list of other people in the aerospace community working with NASA¹¹.** Program managers can tell the chairs the directions the programs are going, but not the specifics. The working groups should think about the overall program more than just the FY 2005 program. Budgets run out 5 years, so they are aggregated. **Terry Hertz and Dr. Crow will contact the working group chairs to see how they can help have reports by February 2003 with interim drafts along the way. They will draw up charging orders¹².** Dr. Crow expects to be in touch with Terry Hertz by phone weekly and monthly with working group chairs. Terry Hertz stated that since the RAS website is public, it might not be a good place to post work in progress. Terry Hertz will send members his chart on the working group tasking.

The working groups are not chartered (no terms of reference). They exist to support the RAS to collect information. They are temporary groups (not standing committees) that do not have a purpose until the RAS asks them to help answer a specific question. Once answered, they are disbanded. They do not make recommendations and do not report to any NASA employee only to the RAS. The RAS uses the information along with other information they gather to make recommendations to the ATAC.

The three working groups and personnel assignments are as follows:

1. Safety System

Chair: John O'Brien

NASA Executive Secretary: George Finelli

Chris Hart

2. Capacity, Infrastructure, or Airspace

Chair: John Hansman

NASA Executive Secretary: Robert Jacobsen

Jack Clemons

¹⁰ Action: Subcommittee Members

¹¹ Action: Program Managers

¹² Action: Dr. Crow/Mr. Hertz

3. Aircraft Vehicles

Chair: Mark Anderson

NASA Executive Secretary: Richard Wlezien

Bill Borger

Mark Miller

Richard Trusis

Mike Benzakein

Evaluation questions are:

- 1) Is the technology right to achieve the goals?
- 2) Is there a coordination or integration plan with the appropriate agencies or organizations?
- 3) Are the resources (funding, manpower, facilities) adequate and available?
- 4) Is there an implementation plan or waiting user in place or a compelling reason to go forward anyway?

If the answers are negative, the working group can make suggestions and help generate implementation or collaboration plans. Dr. Creedon stated the question, "Are these the right programs and goals?" has to be in the mix, too.

The subcommittee discussed the balance of Revolutionize Aviation Subcommittee membership. In forming the subcommittee, Dr. Crow stated they tried to represent the various interest groups. He would like more representation from Raytheon, U.S. airlines, minority universities, and radar manufacturers. They should invite someone from the Aircraft Owners and Pilots Association (AOPA). Ronald Swanda will provide a point of contact. **Dr. Crow and Terry Hertz will finish filling out the committee including inviting Bill Wirth from the ASRSS, someone from Tuskegee university, and someone from AOPA**¹³. ATAC member John Kern represents airlines.

The program objectives will be finalized by mid-October. **If any subcommittee members have comments on the objectives or the mission goals on page 19 of Terry Hertz presentation, they should email them to Terry Hertz at thertz@hq.nasa.gov**¹⁴. They will go to Bob Pearce. Put RAS in the subject line of any emails to Terry.

The subcommittee will meet once more (last 2 weeks in January, first 2 weeks in February) before the ATAC meeting in early February.

¹³ Action: Dr. Crow/Mr. Hertz

¹⁴ Action: Subcommittee Members

ACTIONS SUMMARY

1. Ed Crow: ASRSS Chair, Bill Wirth, should be considered for membership.
2. Subcommittee Members: Look at NASA's vision and mission and the aeronautics strategic goals and comment on the following questions:
 - Are they relevant?
 - Are they the right investment?
 - Are they responsive to the changing national needs?
 - Is NASA employing the best practices and using technology effectively?
3. Subcommittee Members: Email comments on the Revolutionize Aviation objectives to Terry Hertz.
4. Subcommittee Members: Critique and give direction on the planned Revolutionize Aviation programs (whether the content, goals, and how they are going about it are right) within the allocated budget.
 - Whether the subcommittee finds the story compelling or can make it more compelling.
 - Whether the balance is correct within the given budget.
 - Where should we be trying to grow the program, given growth could come from the outside.
 - Whether the subcommittee has some first-order idea of how they're going to take technology they want to collaborate on and make sure it is used.
 - How should we use the subcommittee.
5. Subcommittee Members: Provide thoughts on how to approach the Vehicle Systems Program.
6. Ronald Swanda: Include GA in the language of NASA's strategic plans as it formulates them.
7. John O'Brien/Chris Hart: Work with the Commercial Aviation Safety Team (CAST) to identify recommendations that include NASA and the FAA working in closer partnership to achieve a new goal.
8. John O'Brien: Rework the aviation safety goal to be a powerful, capabilities-based goal.
9. Ed Crow: Write a white paper for the ATAC on European Union's Vision 2020.
10. Subcommittee Members: Volunteer to be on one of the three working groups.
11. Program Managers: Distribute the list of other people in the aerospace community working with NASA.
12. Terry Hertz/Dr. Crow: Contact the working group chairs to see how they can help have reports by February 2003 with interim drafts along the way. Draw up charging orders.
13. Dr. Crow/Terry Hertz: Finish filling out the committee including inviting Bill Wirth from the ASRSS, someone from Tuskegee university, and someone from AOPA.
14. Subcommittee Members: Email comments on the objectives or the mission goals on page 19 of Terry Hertz presentation to thertz@hq.nasa.gov.

APPENDIX A
REVOLUTIONIZE AVIATION SUBCOMMITTEE

NASA Headquarters
300 E Street, S.W.
Conference Room 7H46
Washington, DC 20546-0001

September 20, 2002

8:00 - 8:20	Introduction/Logistics	Ed Crow Terry Hertz
	Advisory Committee Overview	Benjy Neumann
8:20 - 8:50	Revolutionize Aviation Overview	Terry Hertz
8:50 - 9:50	Aviation Safety Program	George Finelli
9:50 - 10:00	Break	
10:00 – 11:00	Airspace Systems Program	Robert Jacobsen
11:00 – 12:00	Vehicle Systems Program	Rich Wlezien
12:00 – 1:00	Lunch	
1:00 – 1:30	RAS Principles for Operations	Ed Crow
1:30 – 2:15	Task Force Discussion	Ed Crow
2:15 – 2:30	Break	
2:30 – 4:00	Task Force Discussion (cont.)	Ed Crow
4:00 – 4:30	Aerospace Technology Enterprise	Jerry Creedon
4:30 – 5:00	Wrap-Up, Actions, and Topics for Next Meeting	Ed Crow Terry Hertz
5:00	Adjourn	

APPENDIX B
REVOLUTIONIZE AVIATION SUBCOMMITTEE MEMBERSHIP

Established: March 15, 2002 (Term 2 years)

Dr. David E. Crow
Chairman, RAS
Pratt & Whitney

Mr. Ronald L. Swanda
Vice President, Operations
General Aviation Manufacturers Association

Mr. Terrence J. Hertz
Executive Secretary, RAS
NASA Headquarters

Mr. Richard J. Trusis
Director, Airworthiness/Certification and
Data Management
Gulfstream Aerospace Corporation

Mr. Mark O. Anderson
Deputy Director,
Flight Configuration Technology
The Boeing Company

Dr. Mike J. Benzakein
General Manager,
Advanced Engine Programs
General Electric Aircraft Engines

Dr. William U. Borger
Director, Plans and Programs
Air Force Research Laboratory

Mr. Jack Clemons
Senior Vice President
Lockheed Martin Air Traffic Management

Professor R. John Hansman, Jr.
Head, Humans and Automation Division
Massachusetts Institute of Technology

Mr. Christopher A. Hart
Assistant Administrator for System Safety
Federal Aviation Administration

Mr. Mark F. Miller
Vice President,
Research and Engineering
Sikorsky Aircraft Corporation

Mr. John E. O'Brien
Director,
Engineering and Air Safety Department
Air Line Pilots Association

APPENDIX C

MEETING ATTENDEES

RAS Subcommittee Members

David E. Crow, *Chair*
 Terrence J. Hertz, *Executive Secretary*
 Mark O. Anderson
 Harvey Maclin
 William U. Borger
 R. John Hansman, Jr.
 Christopher A. Hart
 Michael Torok
 John E. O'Brien
 Ronald L. Swanda
 Richard J. Trusis

Pratt & Whitney
 NASA
 Boeing
 GEAE (Rep)
 AFRL
 MIT
 FAA
 Sikorsky (Rep)
 ALPA
 GAMA
 Gulfstream

NASA Attendees

Jerry Creedon
 George Finelli
 Lon Forehand
 David Hahne
 Robert Jacobsen
 Chuck Johnson
 Bernice Lynch
 David McBride
 Pete McCallum
 Benjy Neumann
 George Price
 Dell Ricks
 Naseem Saiyed
 Joe Shag
 Robert Shaw
 Tom Sutter
 Bill Willshire
 Richard Wlezien
 Dres Zellweger

NASA Headquarters
 NASA Langley
 NASA Headquarters
 NASA Langley
 NASA Ames
 NASA Headquarters
 NASA Headquarters
 NASA Dryden
 NASA Glenn
 NASA Headquarters
 NASA Headquarters
 NASA Langley
 NASA Headquarters
 NASA Glenn
 NASA Glenn
 NASA Langley
 NASA Langley
 NASA Headquarters
 NASA Headquarters

Other Attendees

Steve Moran
 Phil Carrigan

Raytheon
 Raytheon

APPENDIX D

RECOMMENDATIONS

Aviation Safety Program (AvSP)

Comment:

The AvSP has a clearly stated goal and is working excellent progress. However, the committee has concerns regarding the expectation and, hence, credibility of the Enterprise's and program's goal. While making excellent progress, the impact today on aviation's fatal accident rate is zero.

Recommendation:

NASA should work with the committee's Aviation Safety Working Group to ensure goal is clearly stated and there exists clear alignment with the program's user organizations. (Due Date: February 1, 2003)

Airspace Systems Program (ASP)

Comment:

The ASP is making excellent progress in developing decision support tools and supporting their introduction into the National Airspace System. The program also has a good balance among nearer-term hard deliverables, new ideas, and modeling. However, the goal in this area is not clearly defined or universally understood.

Recommendation:

NASA should work with the committee's Airspace Systems Working Group to clearly define the program's goal. (Due Date: February 1, 2003)

Vehicle Systems Program (VSP)

Comment:

The committee applauds the program's approach to reformulate itself with emphasis on the five benchmark vehicles and the GOTCHA process to guide technology development.

Recommendation:

NASA should work with the committee's Vehicle Systems Working Group to refine the benchmark vehicle descriptions and the metrics that define them. Additionally, a first pass of identifying and prioritizing technologies should be accomplished. (Due Date: February 1, 2003)

APPENDIX E

LIST OF PRESENTATION MATERIALS¹⁵

Presentations

- 1) Advisory Committee Overview, Benjy Neumann
- 2) Revolutionize Aviation Overview, Terrence J. Hertz
- 3) NASA's Aviation Safety Program, George B. Finelli
- 4) NASA's Airspace Systems Program, Robert Jacobsen
- 5) Vehicle Systems Program, Richard W. Wlezien

All presentation material can be downloaded in portable document format at the following website:

“<http://www.aerospace.nasa.gov/atac/ras>”

¹⁵ Presentation and other materials distributed at the meeting are on file at NASA Headquarters, Code R, Washington, D.C. 20546.